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| 09/736,225      | 12/15/2000  | Chien-Ping Huang     | EM/HUANG/6315       | 8653             |

7590

04/24/2003

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EXAMINER

PAREKH, NITIN

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 04/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/736,225

Applicant(s)

HUANG ET AL.

Examiner

Nitin Parekh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 March 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 31-44 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 31-44 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 December 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***R**quest for Continued Examination*

1. A request for continued examination (RCE) under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 03/07/03 has been entered. An action on the RCE follows.

2. The amendment filed on 03/07/03 has been entered.

### ***Claim Objections***

3. Claims 31 and 38 are objected to because of the following informalities:

Claim 31, line 5: Delete "die pad" and insert --- "die pad portion"---

Claims 31 and 38, line 7: Delete "lead" and insert --- "lead portion of the " ---

Claims 31 and 38, line 8: Delete "solder masks" and insert --- "solder mask portions"---,

Delete "lead" and insert --- "lead portion of the "---

Claim 31, line 8: Delete "die pad" and insert -- "die pad portion of the"--

Claim 38, line 6: Delete "die pad" and insert --- "die pad portion"---

Claim 38, line 9: Delete "die pad" and insert -- "die pad portion of the"--

Appropriate correction is required.

***CI in Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 31-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Murakami et al. (US Pat. 5866948) in view of Ho (US Pat. 6455926).

Regarding claim 31, Murakami et al. disclose a single semiconductor package consisting of:

- An unsupported layer of a substrate/interposer (1/15 in Fig. 8) linearly consisting of a plurality of resin/epoxy polymer portions (1 and 104 in Fig. 8 and 9 respectively) at selected locations, die pad portion (16 in Fig. 8) of the substrate/interposer layer formed in between and adjacent to the resin/epoxy polymer portions and lead/stud-contact portions (12 in Fig. 8) of the substrate/interposer layer adjacent to the resin/epoxy polymer portions

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- a chip (2 in Fig. 8) being adhered to the die pad portion using a silver paste (Col. 6, line 26)
- a plurality of conductive elements/wires (7 in Fig. 8) electrically connecting the chip and lead/stud-contact portions, and
- a molded resin (11 in Fig. 8) covering the chip, conductive elements/wires and the resin/epoxy polymer, lead/stud-contact and die pad portions of the substrate/interposer layer

(Fig. 8-10; Col. 5, line 30- Col. 6, line 49).

Murakami et al. fail to teach using:

- a) the resin/epoxy polymer being a solder mask, and
- b) the substrate/interposer layer being a single layer such that the die pad and lead portions are contiguous to the solder mask portions

a) Ho teaches using a substrate made of dielectric/insulating layer/material such as a polyimide/solder mask, photo-imageable epoxy resin, glass reinforced polymer/resin, etc. to achieve the desired dielectric and thermal expansion properties (Col. 5, line 35; Col. 3, line 27).

b) Murakami et al. teach in an embodiment of Fig. 12 and 13, the substrate/interposer layer being a single, integrally molded (15 in Fig. 12; Col. 6, line 63; Col. 7, line 40) and co-planar (see Col. 4, line 34), the substrate/interposer layer having die pad and lead portions (16 and 28 in Fig. 12) being contiguous to the resin/epoxy polymer portions (Col. 6, line 50- Col. 7, line 47).

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the solder mask portions as taught by Ho such that use the die pad and lead portions of a single layer are contiguous to the solder mask portions in order to reduce the package dimension/size and to improve the dielectric properties in Murakami et al's package.

Regarding claim 32, Murakami et al. teach substantially the entire claimed structure as applied to claim 31, except the solder mask being made from photosensitive and insulative material selected from a group consisting of polyimide and UV-curable resins.

Ho teaches using a substrate made of dielectric/insulating layer/material such as a polyimide/solder mask, photo-imageable/sensitive epoxy resin, and glass reinforced polymer/resin, etc. to achieve the desired dielectric and thermal expansion properties (Col. 5, line 35; Col. 3, line 27).

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the solder mask the solder mask being made from

photosensitive and insulative material selected from a group consisting of polyimide and UV-curable resins so that package dimension/size can be reduced and the dielectric properties can be improved in Murakami et al's package.

Regarding claim 33, Murakami et al. teach substantially the entire claimed structure as applied to claims 31 and 32, and further teach the die pad and lead portions being made of a material selected from a group consisting of nickel (Col. 6, line 18-20) and gold (Col. 5, line 5).

Regarding claims 34 and 35, the process for forming the solder mask and lead/die pad portions of the layer do not distinguish over Murakami et al. and Ho, because only the final product is relevant, not the process of making such as "coating or photo-processing" and "plating or sputtering" respectively. Note that a "product by process" claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marrosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims

or not . Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

Regarding claim 36, Murakami et al. teach substantially the entire claimed structure as applied to claim 31, and further teach the conductive elements being made of a material such as gold (Col. 6, line 28).

Regarding claim 37, Murakami et al. teach substantially the entire claimed structure as applied to claim 31, except the die pad portion of the layer being replaced by the solder mask.

Murakami et al. further teach using the substrate layer having the die pad portion of the layer (not numerically referenced in Fig. 1; see top surface of 1 under the chip 2) being made of an insulating resin/glass reinforced epoxy resin (Col. 4, line 22; Col. 6, line 37).

Ho teaches using a substrate made of dielectric/insulating layer/material such as a polyimide/solder mask, photo-imageable/sensitive epoxy resin, and glass reinforced polymer/resin, etc. to achieve the desired dielectric and thermal expansion properties (Col. 5, line 35; Col. 3, line 27).

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the die pad portion of the layer being the solder



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mask so that package dimension/size can be reduced and the dielectric properties can be improved in Murakami et al's package.

Regarding claim 38, Murakami et al. teach substantially the entire claimed structure as applied to claim 31, including the chip being adhered to the die pad portion using the silver paste.

Regarding claim 39, Murakami et al. teach substantially the entire claimed structure as applied to claims 38, 31 and 32, including the solder mask being made from photosensitive and insulative material selected from a group consisting of polyimide and UV-curable resins.

Regarding claim 40, Murakami et al. teach substantially the entire claimed structure as applied to claims 38, 31 and 33, including the die pad and lead portions being made of a material selected from a group consisting of nickel and gold.

Regarding claims 41 and 42, the process for forming the solder mask and lead/die pad portions of the layer do not distinguish over Murakami et al. and Ho, because only the final product is relevant, not the process of making such as "coating or photo-processing" and "plating or sputtering" respectively. Note that a "product by process"

claim is directed to the product per se, no matter how actually made, In re Hirao, 190 USPQ 15 at 17 (footnote 3). See also In re Brown, 173 USPQ 685; In re Luck, 177 USPQ 523; In re Fessmann, 180 USPQ 324; In re Avery, 186 USPQ 161; In re Wertheim, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and In re Marrosi et al., 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 706.03(e).

Regarding claim 43, Murakami et al. teach substantially the entire claimed structure as applied to claims 38, 31 and 36, including the conductive elements being made of a material selected from a group consisting of gold, copper and aluminum.

Regarding claim 44, Murakami et al. teach substantially the entire claimed structure as applied to claims 38, 31 and 37, including the die pad portion of the layer being replaced by the solder mask.

***R s p n s   t o   A r g u m e n t s***

6.      Applicant's arguments with respect to claims 1-8 and 17-30 have been considered but are moot in view of the new ground(s) of rejection.

***C o n c l u s i o n***

7.      The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reference N is cited as being related to a Flat Package (FP).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number is 703-305-3410. The examiner can normally be reached on 09:00AM-05:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 703-308-2772. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722, 703-308-7724 or 703-872-9318 (Right FAX) for regular communications; 703-872-9310 (Right FAX) for After Final communications and 703-872-9310 (Right FAX) for customer service.

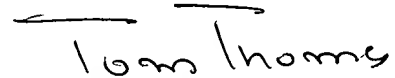
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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-3431.

Nitin Parekh

NP

04-18-03

A handwritten signature in black ink that reads "Tom Thomas". The signature is written in a cursive, slightly slanted style.

TOM THOMAS  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2800